DETAILED ACTION

Response to Appeal Brief

In view of the Appeal Brief filed on 06/03/11 PROSECUTION IS HEREBY REOPENED. Applicant's arguments with respect to the rejection(s) of method claims 1-2, 5-6, 9, 11, 25 and 27-28 have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejection has been made for apparatus claims 3-4, 7-8, 10, 12 and 26.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/JESSICA L. WARD/

Supervisory Patent Examiner, Art Unit 1735

Claim Objections

Claim 1 is objected to because of the following informalities: the limitation "soldering the interconnectors to the solar battery cells *while transporting* the solar battery cells and the interconnectors" should be clarified with respect to transporting. It is noted that the solar battery cells and the interconnectors are being "transported" throughout the entire production method and so, all recited steps occur "while transporting". According to specification, soldering takes place as the cells and interconnectors are moved along the heating belt (fig. 6d; ¶ 36) and thus, soldering and moving along the heating belt takes place simultaneously. Hence, for clarification, it is requested to recite: *"holding the solar battery cells and the interconnectors transferred onto the heating belt between the heating belt and the press belt and soldering the interconnectors to the solar battery cells* <u>*while moving the solar battery cells and the interconnectors along the heating belt."*</u>

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. **Claims 3-4 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over <u>Shimotomai (US 6367530) in view of Toyama (JP-11278626 A, of record), and further in view of Meyer (US 4997507).</u>

a. **Regarding claim 3,** Examiner notes that "*solar battery module production apparatus to be used for...method as recited in claim 1*" is NOT limited by the method steps of claim 1 and only requires apparatus structure. A claim

containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim *(See MPEP 2114). Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).*

Shimotomai discloses a solar battery module production apparatus (col. 1, lines 6-8) comprising:

a carrying-in conveyor 22 (positioning belt) and a lower heating belt 14 (heating belt = lower belt + heating plate 11) adjacent each other in a transferable manner (figs. 8-12);

an upper belt 15 (press belt) extending over the positioning belt and the heating belt in an opposed relation to the positioning belt and the heating belt such that the press belt overlaps at least a portion of the positioning belt (fig. 10; col. 6, line 30 thru col. 7, line 14). Shimotomai discloses that the lower heating belt 14 has no suction hole.

Shimotomai does not disclose the positioning belt 22 having a vacuum suction hole. However, such technique is well known in the art. **Toyama** is drawn to semiconductor wafer conveyor used for solar cell, integrated circuit manufacture (Derwent- Abstract). Toyama teaches that through-holes provided on the conveying belt keep the wafer (substrate) vacuum fixed, inhibits deviation of the substrate position and thus, the transfer operation of the substrate is performed efficiently (advantage). In view of that, it would have been obvious to a

person of ordinary skill in the art at the time of the invention to incorporate vacuum holes similar to Toyama in the positioning belt of Shimotomai because doing so would prevent deviation of the solar modules during conveying and would result in smooth transition of the substrate to the heating belt (Toyama). Therefore, Shimotomai as modified by Toyama includes holding the solar cells and the interconnectors in a proper position by the action of vacuum suction holes during conveying.

Shimotomai is silent whether the apparatus is adapted to control the heating belt and the press belt at predetermined temperatures. However, **Meyer** (drawn to apparatus for bonding laminar workpieces- abstract) discloses upper heating blocks (42, 48- fig. 1), lower heating blocks (40, 46) between a lower conveyor belt 18 and an upper conveyor belt 20 (fig. 1). Meyer teaches that such heating blocks are known to one skilled in the art and are controllable to set the temperature of their respective heating surfaces in order sufficiently heat the workpieces, cause fusion and form a sufficient bond (col. 5, lines 50-58). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to provide controllable heating blocks similar to Meyer in the apparatus of Shimotomai since such is conventional in the art. An artisan would have been motivated to provide controllable heating blocks of Meyer in the conveyor apparatus of Shimotomai in order to effectively regulate the temperature and uniformly heat the workpieces (solar modules).

b. As to claim 4**,** Shimotomai teaches that the belt 14 is made of a glass cloth sheet immersed in a resin having a releasing function so that sticking of melting fillers is avoided (col. 6, line 66 thru col. 7, line 7). In view of that, it would have been obvious to a person of ordinary skill in the art at the time of the invention to provide the positioning belt with a resin surface because such imparts a releasing function which results in smooth transfer of the solder module during conveying from the positioning belt to the heating belt.

c. As to claim 12, Shimotomai discloses a lower heating block 11 disposed on a back side of belt 14, but fails to disclose an upper heating block or cooling blocks as claimed. However, **Meyer** (drawn to apparatus for bonding laminar workpieces, fig. 1) discloses upper heating blocks (42, 48), lower heating blocks (40, 46), and cooling blocks 70 (both upper & lower). Meyer teaches that such heating/cooling blocks are known to one skilled in the art and are controllable to set the temperature of their respective heating/cooling surfaces in order to uniformly heat/cool the workpieces, and thus form a sufficient bond (col. 5, lines 50-58; col. 6, lines 36-46). Meyer also discloses that apparatus is not limited to the configuration of the two conveyor belt assemblies (14, 16), but, if desired, it may include only one conveyor belt assembly. In such a case, the lower conveyor belt (i.e. heating belt 18) would extend from the feed station through the delivery station, including the cooling zone. Similarly, the upper belt (press belt 20) would extend through the exit of the cooling zone (col. 8, lines 58-68). Such an arrangement would include upper and lower cooling blocks as claimed.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to provide controllable heating blocks similar to Meyer in the apparatus of Shimotomai since such is conventional in the art. An artisan would have been motivated to provide controllable heating and cooling blocks of Meyer in the conveyor apparatus of Shimotomai in order to effectively regulate the temperature and uniformly heat or cool the workpieces (solar modules).

2. **Claims 7-8 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimotomai in view of Toyama and Meyer as applied to claim 3 above, and further in view of Focke et al. US 5674542, of record).

d. As to claims 7-8, none of the references above discloses at least one upper and lower resilient member to bias the heating belt and the press belt toward each other. However, **Focke** discloses flexible leaf springs 35 which exert pressure on the upper conveyor belt 24 so that the upper conveyor 24 and the lower conveyor 23 are pressed together (fig. 1; claim 3). The claim would have been obvious because employing leaf springs similar to Focke in the upper and lower conveyor belts of Shimotomai would have yielded the predictable result of effectively pressing the conveyor belts together to one of ordinary skill in the art at the time of the invention. A person of ordinary skill in the art would have been motivated to incorporate such leaf springs in the conveyor apparatus of Shimotomai in order to provide effective heating by pressing the belts while conveying the solar cells.

e. As to claim 10, the claim would have been obvious to an artisan at the time of the invention since providing a number of resilient members as claimed is merely a provision of adjustability, which involves only routine skill in the art (MPEP 2144.04). One would provide suitable upper and lower resilient members depending the desired pressing of the belts toward each other.

3. **Claim 26** is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimotomai in view of Toyama and Meyer as applied to claim 3 above, and further in view of Garbini et al. (US 3883386, "Garbini").

f. As to claim 26, none of the references above discloses at least one of heating belt and the press belt being a metal belt. **Garbini** is drawn to a continuous conveyor apparatus for joining flat materials by heating under pressure. Garbini discloses a positioning belt 4, a press belt 1 and a heating belt 3 (fig. 1) similar to Shimotomai. Garbini teaches continuous metal belts, steel belts are preferred for their mechanical resistance and further teaches that the conveyor metal belts are lined with an antiadhesive material such as fiber glass or Teflon (col. 2, lines 27-59; col. 3, lines 53-56). The steel belts lined with antiadhesive material in Garbini are analogous to antiadhesive glass-resin belts of Shimotomai. Garbini also discloses that continuous metal belts having low electrical resistance obtain a very fast and uniform heating of the whole belt (col. 1, lines 56-67). It would have been obvious to a person of ordinary skill in the art to modify at least the heating belt of Shimotomai so as to provide metal belts similar to Garbini because it would provide good mechanical resistance, fast &

uniform heating and avoid sticking/adhesion between the solar module and the belts (Garbini). Moreover, the claim would have been obvious because the substitution of one known element (conveyor belt) for another would have yielded predictable results to one of ordinary skill in the art.

Allowable Subject Matter

Claims 1-2, 5-6, 9, 11, 25 and 27-28 would be allowable if last paragraph of claim 1 is amended to overcome the objection above and recite: --holding the solar battery cells and the interconnectors transferred onto the heating belt between the heating belt and the press belt and soldering the interconnectors to the solar battery cells **while moving the solar battery cells and the interconnectors along the heating belt.**

The following is a statement of reasons for the indication of allowable subject matter:

Prior art fails to teach a production method for a solar battery module comprising: utilizing apparatus including a press belt overlapping at least a portion of the positioning belt, the positioning belt having a vacuum suction hole and the heating belt having no suction hole; transferring the solar battery cells and the interconnectors transported to the downstream portion of the positioning belt onto the heating belt while holding the solar battery cells and the interconnectors between the positioning belt and the press belt; and holding the solar battery cells and the interconnectors transferred onto the heating belt between the heating belt and the press belt and soldering the

interconnectors to the solar battery cells while moving the solar battery cells and the interconnectors along with the heating belt.

Shimotomai (US 6367530) discloses the recited apparatus structure, but fails to teach holding the solar battery cells and the interconnectors between the heating belt and the press belt and soldering the interconnectors to the solar battery cells while moving the solar battery cells and the interconnectors along with the heating belt. Shimotomai teaches that the solar module is never moved while being laminated and thus, unlike present claim, laminating (type of bonding- like soldering) and moving the product cannot occur simultaneously. Tonari (JP-2000-022188) discloses soldering the interconnectors to the solar battery cells while moving the solar battery cells and the interconnectors along with the heating belt. However, Tonari teaches away from recited method since Tonari requires heating belt having suction holes to absorb the solar cells for transporting. Considering disclosures of Shimotomai and Tonari as a whole, a person of ordinary skill in the art would not combine Shimotomai with soldering step of Tonari because the solar cells and interconnectors in Shimotomai have already been connected (soldered) before being laminated. At the time of the invention, no motivation was found for one of ordinary skill in the art to modify solar module production processes in prior art so as to arrive at the claimed method.

Conclusion

The rejections above rely on the references for all the teachings expressed in the text of the references and/or one of ordinary skill in the art would have reasonably understood from the texts. Only specific portions of the texts have been pointed out to emphasize certain aspects of the prior art, however, each reference as a whole should

be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied upon in future rejections in view of amendments.

Applicant is reminded to specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. 1.121; 37 C.F.R. Part 41.37; and MPEP 714.02.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEVANG PATEL whose telephone number is (571)270-3636. The examiner can normally be reached on Monday thru Thursday, 8:00 am to 5:30 pm, EST..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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